VERDIGRIS RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Water Body: Woodson Wildlife Area
Water Quality Impairment: Fecal Coliform Bacteria

Subbasin: Upper Verdigris

County: Woodson

HUC 8: 11070101

HUC 11 (HUC 14)**:** **040** (030)

Ecoregion: Central Oklahoma/Texas Plains - Cross Timbers (29a)

Drainage Area: Approximately 3.5 square miles.

Conservation Pool: Area = 1.0 acres
Maximum Depth = 1.0 meters (3.3 feet)
Mean Depth = 0.1 meters (0.33 feet)
Retention Time = 0.2 day

Designated Uses: Primary and Secondary Contact Recreation; Special Aquatic Life Support; Food Procurement

Authority: State (Kansas Department of Wildlife and Parks)

1998 303d Listing: Table 4 - Water Quality Limited Lakes

Impaired Use: Secondary Contact Recreation

Water Quality Standard: 2000 colonies per 100 ml for Secondary Contact Recreation (KAR 28-16-28e(c)(7)(C))

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Monitoring Sites: Station 011841 in Woodson WA (Figure 1).

Period of Record Used: Four surveys during 1997 - 2000.

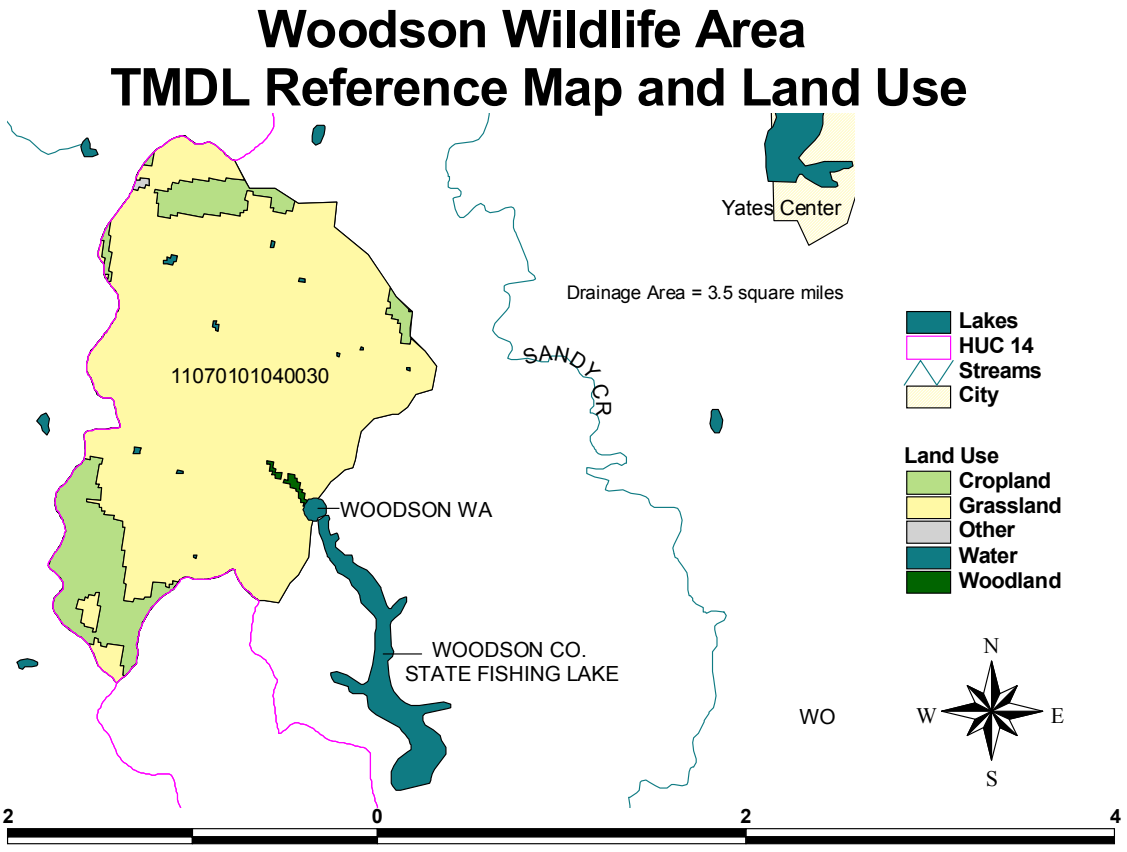
Current Condition:
Over the four years that surveys were taken, the Fecal Coliform Bacteria count was high 13% of the time. The average concentration of Fecal Coliform Bacteria was 524 counts per 100 mL,

ranging from 10 to 2,010 counts per 100 mL (Appendix A). The highest counts were seen in the summer of 1997. (See the table below).

Fecal Coliform Bacteria data from the KDHE Lake Monitoring Program

Site Name	Date	Fecal Coliform Bacteria (counts/100mL)
LM011841	8/19/97	**2010**
LM011841	8/19/97	2000
LM011841	8/17/98	20
LM011841	8/17/98	10
LM011841	8/9/99	60
LM011841	8/9/99	30
LM011841	8/7/00	20
LM011841	8/7/00	40

Figure 1



Interim Endpoints of Water Quality (Implied Load Capacity) at Woodson WA over 2007 - 2011:

The desired endpoint will be to have Fecal Coliform Bacteria samples fall below 2000 counts per 100 mL**.** Refined endpoints will be developed in 2007 to reflect additional sampling and artificial

source assessment and confirmation of impaired status of wetland.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: Fecal Coliform Bacteria from animal waste (wildlife and livestock) is the main contributing factor. Eighty-six percent of land around the wildlife management area is grassland. Grazing density of livestock is moderate in summer and winter. Manure applied to cropland (13.4% of the watershed) is another source of Fecal Coliform Bacteria. Some organic pollution is contributed by wildlife; it is likely that the population of animals such as deer and water fowl is high in the Wildlife Management Area.

On-Site Waste Systems: The population density in the watershed is low (2.6 people per square mile). The population projections for Yates Center through 2020 show the density declining (-2.6%). Failing on-site waste systems can contribute bacteria loadings.

Contributing Runoff: The watershed's average soil permeability is 0.5 inches/hour according to NRCS STATSGO database. About 99.6% of the watershed produces runoff even under relatively low (1.5''/hr) potential runoff conditions. Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. As the watersheds' soil profiles become saturated, excess overland flow is produced. Generally, storms producing less than 0.5"/hr of rain will generate runoff from only 44.4% of this watershed, chiefly along the stream channels.

4. ALLOCATION OF POLLUTANT REDUCTION RESPONSIBILITY

More detailed assessment of sources and confirmation of the Fecal Coliform Bacteria impairment must be completed before detailed allocations can be made. The general inventory of sources within the drainage does provide some guidance as to areas of load reduction.

Point Sources: A current Wasteload Allocation of zero is established by this TMDL because of the lack of point sources in the watershed. Should future point sources be proposed in the watershed and discharge into the impaired segments, the current wasteload allocation will be revised by adjusting current load allocations to account for the presence and impact of these new point source dischargers.

Nonpoint Sources: Water quality violations are due to nonpoint source pollution. The assessment suggests that animal waste contribute to the Fecal Coliform Bacteria impairment. Given the runoff characteristics of the watershed, overland runoff can easily carry the bacteria into the Wildlife Management Area. A Load Allocation of 1,800 colonies per 100 ml will be set for Secondary Contact Recreation.

Defined Margin of Safety: The margin of safety provides some hedge against the uncertainty of variable Fecal Coliform Bacteria load. Therefore, the margin of safety will be 200 colonies per 100 mL taken from the load capacity subtracted to compensate for the lack of knowledge about

the relationship between the allocated loadings and the resulting water quality.

State Water Plan Implementation Priority: Because Woodson WA is a wetland under state jurisdiction, this TMDL will be a Medium Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Upper Verdigris (HUC 8: 11070101) with a priority ranking of 58 (Low Priority for restoration).

Priority HUC 11s: The watershed is within HUC 11 (040).

5. IMPLEMENTATION

Desired Implementation Activities
Best Management Practices may be able to curtail excessive bacterial inputs. Some of the recommended agricultural practices are as follows:

1. Install proper manure storage
2. Implement nutrient management plans to manage manure application to land

Implementation Programs Guidance
Until the 2007 assessment of the continuation of monitoring is made, no direction can be made to those implementation programs.

Time Frame for Implementation: Continued monitoring over the years from 2002 to 2007.

Targeted Participants: Primary participants for implementation will be state and county officials responsible for managing the wetland.

Milestone for 2007: The year 2007 marks the midpoint of the ten-year implementation window for the watershed. At that point in time, sampled data from Woodson WA will be reexamined to confirm the impaired status of the wetland. Should the case of impairment remain, source assessment, allocation, and implementation activities will ensue.

Delivery Agents: Depending upon confirmation of impairment and assessment of probable sources, the primary delivery agents for program participation will be the Kansas Department of Wildlife and Parks, conservation districts for programs of the State Conservation Commission, and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State Extension.

Reasonable Assurances:

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollutants.

1. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.

2. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.

3. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control nonpoint source pollution.

4. K.S.A. 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.

5. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan.*

6. The *Kansas Water Plan* and the Verdigris Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund annually generates $16-18 million and is the primary funding mechanism for implementing water quality protection and pollutant reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This watershed and its TMDL are a Low Priority consideration and should not receive funding until after 2007.

Effectiveness: Effectiveness of corrective actions will depend upon the sources which contribute to the impairment at the lake.

6. MONITORING

Further sampling and evaluation should occur once before 2007.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Verdigris Basin were held January 23 in Fredonia and March 6, 2002 in Neodesha. An active Internet Web site was established at http://www.kdhe.state.ks.us/tmdl/ to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Verdigris Basin.

Public Hearing: A Public Hearing on the TMDLs of the Verdigris Basin was held in Neodesha on June 4, 2002.

Basin Advisory Committee: The Verdigris Basin Advisory Committee met to discuss the TMDLs in the basin on October 3, 2001, January 23, March 6, and June 4, 2002.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:
Kansas Farm Bureau: February 26 in Fredonia

Milestone Evaluation: In 2007, evaluation will be made as to the degree of impairment which has occurred within the watershed and current condition of Woodson WA. Subsequent decisions will be made regarding the implementation approach and follow up of additional implementation in the watershed.

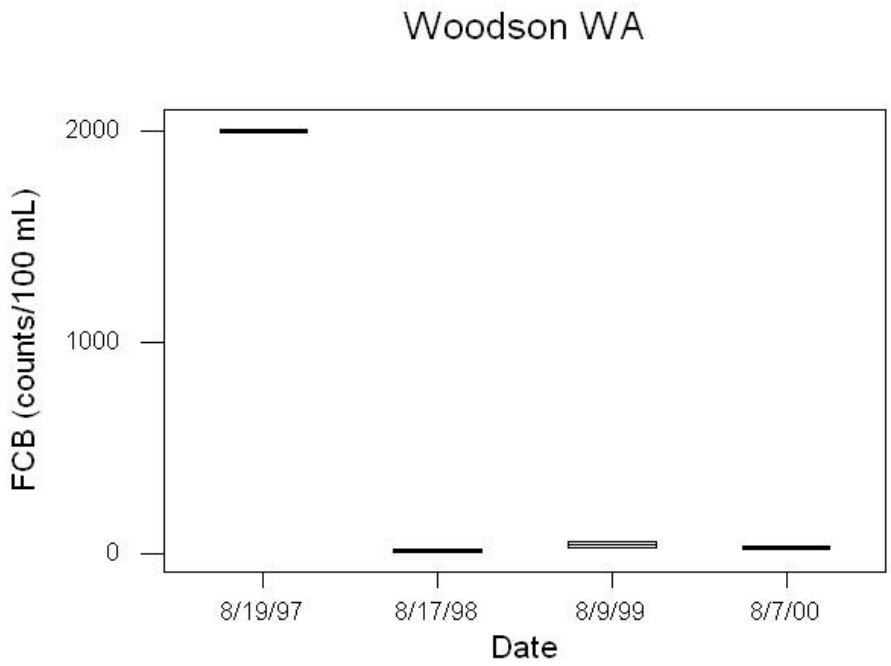
Consideration for 303(d) Delisting: The lake will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2007-2011. Therefore, the decision for delisting will come about in the preparation of the 2012 303(d) list. Should modifications be made to the applicable water quality criteria during the ten-year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2003 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2003-2007.

Bibliography

Liscek, Bonnie C. Methodology Used in Kansas Lake TMDLs [web page] Jul. 2001; http://www.kdhe.state.ks.us/tmdl/eutro.htm [Accessed 17 May 2002].

Appendix A - Boxplots



Approved September 30, 2002